

The Physiological Bearing of Waist-Belts and Stays.

To explain the use of any article is not to justify its abuse. In the following pages we deal wholly with the physiological aspect of constriction of the waist, and only refer to the utility of abdominal compression; it must not be thought that we therefore countenance any extreme course, or that we for a moment deny that this constriction may be of such a nature, or be carried to so great an excess, or be employed under such adverse conditions, as to lead to serious bodily harm. Our object is to discuss the *physiology* and not the *pathology* of constriction of the waist.

In the course of a series of investigations with which we have been recently occupied, on the nature of certain forms of heart disease, a number of facts have come to our knowledge, which appear to us to throw much light on the matter expressed by the title of our paper. We think that, with the conclusions which may reasonably be drawn from them, these facts may be of interest to non-medical readers.

Let us begin by saying that the functional activity of any of the tissues of the body is dependent on its blood supply; increased activity, for example, requiring an increased supply of blood. Thus, when a muscle contracts, this contraction is accompanied by an augmented flow of blood through its vessels, these becoming more expanded than when the muscle is at rest. The same fact applies, so far as is known, to all other organs of the body.

The amount of blood pumped out by the heart into the arteries is distributed, by a wonderfully perfect vaso-motor mechanism, to the different tissues of the body in conformity with their requirements at any given time. It may be added, also, that anything which increases the amount of blood sent out by the heart in a given time, will tend, *cæteris paribus*, to increase the activity of the tissues to which the blood is distributed. All this, of course, within certain limits which need not be defined here. The above statements are fully accepted by physiologists, and we only give them here in order that the general reader may see the bearing of what follows.

In our investigations we employed an instrument—a Cardiometer—which permits of the amount of blood sent out by the heart being accurately measured.

In the course of our work with this instrument we found that even slight pressure upon the abdomen resulted in the expelling by the heart of a considerably increased quantity of blood in a given time, and this, without increasing the rapidity of the heart-beat. At each impulse, that is, a larger amount was driven out. Thus, for instance, in one experiment, compression of the abdomen increased the quantity of blood thrown out by the heart, to the extent of 29.6 per cent. during the period of compression. In some of our other experiments even a larger increase was obtained. Further, the increased outflow from the heart, which is in this way produced, is not limited to the few seconds after the first application of the pressure, but persists concurrently with the pressure.

These results, with which physiologists have not hitherto been acquainted, can be easily enough explained. The calibre of the veins (which are especially large and numerous in the abdominal cavity) is much more affected by a slight pressure than that of the arteries. Hence slight abdominal pressure has but little influence upon the inflow to the abdominal viscera, while accelerating the outflow from these organs, and will, without harming their nutrition (seeing that within fairly wide limits, variations in the amount of blood in the veins do not affect the supply of nourishment to the parts drained by those vessels), press into the service of the rest of the body a correspondingly increased volume of blood. Or, in other words, such pressure diminishes the quantity of blood which is stored in the abdominal veins and venous capillaries, and places more of it at the disposal of the organism as a whole.

We may note, in passing, that the opposite condition of congestion, or sudden distension of the abdominal veins, by withdrawing blood from the general circulation, is a recognised cause of fainting, bringing about, as it does, an insufficiency in the blood supply to the brain.

Great pressure does indeed increase still more the quantity of blood taken from the abdominal organs, and therefore available for the supply of the rest of the system, but this implies an interference with the nutrition of the organs in question. It must be kept in mind, however, that such extreme pressure, harmful as it must be, is not equally so at all times; for example, when functional activity is slight, as between the acts of digestion which follow meals, interference with the blood supply will, it need hardly be said, be less injurious than at times when the tissue change is more active.

Pressure on the abdomen, or constriction of the waist, which comes to the same thing, increases therefore the amount of blood placed at the disposal of the muscles, brain, skin, &c. Moreover, this increased blood supply, on which the degree of functional

activity of the tissues so greatly depends, may be obtained without serious interference with the nutrition of the organs that fill the abdominal cavity. It is to be noted, also, that in front and at the sides the abdomen is bounded by walls having no bony framework, formed partly of muscles, which always contract involuntarily during great physical exertion. Even in the case, however, of a typically healthy unsophisticated savage the action of these muscles which compress the abdominal viscera will be assisted by the wearing of a belt. The efficacy of such a girdle is not so great when formed of an elastic material, as when it is composed of some comparatively inelastic substance such as leather. In the case of civilized man, and still more in the case of women, weakness of the muscles in question is common enough, and with them the support given by a girdle is even greater than with savages.

These considerations explain how it is that men, as well as women, finding a definite gain therefrom, have taken to the employment of some method of abdominal compression, wearing waistbands, belts, or the more elaborate corset, and this, in some cases only temporarily, at periods of increased activity, in others throughout the day. Having been led thus to examine into the custom, we have been surprised to learn how widely spread and how ancient it is.

Let us refer briefly to this custom of constricting or supporting the waist, as employed at various times in the history of the human race, and by different peoples.

The Egyptians, whose history, as recorded on their monuments and in their writings, is the most ancient of any with which we are acquainted, habitually wore broad belts of one kind or another. These girdles were used by both sexes, and, we are informed by Professor Macalister, were worn tight, this being apparently the cause of the remarkably slim waists which are so characteristic a feature of the sculptures and paintings of the ancient Egyptians. The breadth of their girdles varied considerably, but they were usually broad, and made of linen. The women appear to have frequently worn two distinct girdles, one high up, immediately below the bosom, while the other was placed lower, just above the hip-bones. There is no reason to suppose that the one round the waist proper was used to support any part of the clothing.

The Semitic races, who derived their civilization mainly from the Egyptians, also wore girdles as part of their ordinary costume. With regard to the Jews and Phœnicians, we may remark that girdles, which were worn by both sexes, were recognized as being of benefit in assisting active exertion. As an instance of this, the case of Elijah may be quoted—2 Kings xviii. 46—where it is stated that the prophet “girded up his loins” to run before Ahab. As is

mentioned elsewhere in Scripture, Elijah wore a leathern girdle, and the words in the original, which have been translated "girded up," should be rather "tightened up," and can be rendered more exactly by the Latin "*fortiter constrinxit*," than the usual English translation, which might lead to the erroneous impression that pulling up of the skirts was meant. The girding up of the loins referred to elsewhere in the Old Testament—for example, with regard to the ceremonies observed at the feast of the Pass-over—has the same signification, and expresses also the connection between such girding and active exertion. The Arab tribes of our own day wear girdles from their earliest infancy, and we are informed by Prof. Robertson Smith that in the case of the Bedouins, they are worn tight as a matter of respectability. He further tells us that when he himself travelled in an Arab dress, he was instructed always to draw his girdle tight, a loose girdle being regarded in the East, at the present day, as characteristic of a dissolute, luxurious person. In the privacy of home life the girdle is either loosened or removed. Many similar examples could be given with regard to other Semitic races.

When we come to the Greeks, it need hardly be said that the girdle was an essential part of the male and female costume. The expression *εὐζωνος*, employed by Herodotus, and other writers, where the distance between two places is referred to as what "a well-girt man" can do in a given time, shows that the Greeks also had recognized the connection between tight waist-belts and active muscular exertion. Greek women, we know, used several varieties of girdles, wearing frequently, and at one period of Greek history, usually, one girdle below the bosom, and the other round the waist, lower down, the upper one being sometimes called the *Strophion*, which was worn over the under tunic, while the other, the *Zone*, was worn round the waist proper, or even lower. The *Zone*, or *Cestus of Venus*, which, as will be remembered, was borrowed by the Queen of Heaven, is represented in very archaic figures of the younger goddess as being worn round the waist; higher, therefore, than the virgin *Zone*, and lower than the *Strophion*. Diana is often represented as wearing both the upper and lower girdles.

The leathern girdle of the Greek soldiers, frequently referred to as the *Mitra*, was worn at the bottom of the cuirass. The corresponding military belt of the Romans was called the *Gingulum*.

The Roman women also employed a variety of girdles, similar in position and purpose to those used by the women of Greece. Amongst the Romans, the girdle was worn tight, it being considered most effeminate and indecorous for a man to appear in the street with the tunic loosely girded. For instance, Nero, Mæcenas,

and even Julius Cæsar, were spoken of disparagingly, owing to their appearing in public, either ungirt or loosely girded. When the Egyptian, Greek, or Roman women wore more than one girdle, one only of these, as a rule, appeared outside the tunic, the other, or others, being worn either next the skin or over some under garment. One must add, however, that exceptions to this are common enough.

After the decadence of the Roman Empire, girdles continued to be worn. In Weiss' *Kostümkunde*, for the period from the fourth to the fourteenth century, they are referred to as forming part of the costume of all European nations.

The information which we have been able to collect as to the employment of girdles during the Middle Ages is less full in detail than that which is so easily obtained in the case of the Greeks and Romans. We may say, however, that the recumbent effigies on the tombs of knights and ladies point very clearly to the conclusion that girdles were worn by the nobility of both sexes. These girdles were often elaborately worked and embroidered; indeed, ornamental girdles of one kind or another have been employed from the earliest recorded times.

This brings us to consider the difficult question of the relation between girding and its employment for what may be termed æsthetic purposes. We have referred to the tightness of the girdles worn by some civilized races of antiquity. The comparative narrowness of these girdles, however, limited the degree of tightness to which they could be drawn without causing pain as well as disfigurement. Towards the fourteenth century, however, girdles appear to have increased in breadth. Strutt, who is a very trustworthy authority on costumes, says (*English Dresses*): "Towards the conclusion of the fourteenth century, women were pleased with the appearance of a long waist, and in order to produce that effect, they invented a strange disguise, called a corse or corset." "The word corset appears at least as early as the thirteenth century," and in sumptuary laws made early in the reign of Edward IV., wrought corsets, and corsets worked with gold, are restricted to certain classes of the female nobility. They appear, however, to have been worn by both sexes, and were usually quilted, having slips of whalebone between the quilting. Their breadth, together with the mode of fastening them by lacing, permitted of their being drawn very tight, and thus produced the slim waists referred to by various writers of the period. "A French moralist (!), who wrote during the reign of Henry VI., says: 'By detestable vanity, ladies of rank now cause their robes to be made so tight in the waist that they can scarcely respire in them, and so often suffer great pain by it, in order to make their bodies small.'" "In the time of Queen Elizabeth," says Strutt, "the bodice was used

also by men, though this custom, I believe, was never generally adopted."

Pictures of some of the remarkable men of that time are represented with slim waists, which are presumably the result of such tight lacing. From that period up to our own day corsets have been worn by women of England and of most other civilized nations. They combine in one the *mammillare*, the *strophion*, the *zoster*, the *zona*, &c., &c., &c. of the ladies of ancient Greece and Rome.

That the wearing of corsets is a gain to many women is evident enough from the fact that they are worn under conditions in which the wearers are regardless of mere appearance. For instance, we may cite the working peasant-women, unmarried as well as married, of France, Switzerland, the Tyrol, Austria and Hungary, &c., &c., who wear stays during the performance of very laborious work, yet who, one could not suppose, would do this if their stays interfered with their comfort or movements.

Another example of the same fact is illustrated by the very poor working-women of our own nation, who, when obliged to sell their clothes, or, when these hang about them in rags, still, as a rule, stick to the use of stays.

Many other examples to the same effect might be given, showing that mere regard for appearance will not, as is usually supposed, explain the wide-spread adoption by the women of our own time of corsets, or of tightly-bound sashes, as in the case, for instance, of the countrywomen of Spain.

In view of such facts, it may be asked why the custom of wearing corsets has been so generally looked upon as nothing more than a saddening example of how far this regard for appearance will lead the gentler sex to disregard common sense. The answer to this question is presumably to be found in the fact that the objections to the custom are more evident to men, and especially to medical men, than are any advantages which it may possess. Thus, constriction of the waist causes, or increases, pain in certain diseased conditions; the use of stays causes the body to differ in shape from that which it would otherwise present; no evident good could be seen to accrue from the practice; and, finally, no line of distinction has, as a rule, been drawn between the glaringly harmful "slyph-waist" of the lady who sacrifices too much to fashion, and the moderate constriction of the waist employed by the vast majority of womankind.

The facts stated in the above pages appear to us fitted to explain why, in spite of such evident objections, the custom of wearing stays still holds its own.

The constriction usually produced by properly constructed stays acts chiefly, we are informed, by compressing the waist, resembling

so far the broad belt which has been associated in men with active exertion ; while the rest of this elaborate article presumably replaces the various other girdles which we have referred to as worn by the women of ancient times. If this be the case, we do not see that any distinction is to be drawn between the constriction of the waist produced by the corset, and that which results from the tight belt associated, in the case of men, with active exertion—keeping in mind, however, that in the former the girdle is of greater breadth, and so permits of greater compression, which, in excess, is necessarily harmful. If the corset be so tight as to cause the wearer to become short of breath when walking fast, when playing tennis, or when running upstairs ; or, again, when “ stitch ” in the side, or any discomfort is experienced : then it may easily be assumed that the wearer is making an unwise sacrifice to fashion. Such excessive compression, or blindly continuous slighter constriction, will, we may safely say, be countenanced by no physiologist. None feel this more strongly than we do. We do not think that what we have said above warrants the conclusion that all women *ought* habitually, or even at periods of active exertion, to wear corsets, any more than that all men, or even that all athletes, ought to wear more or less tight belts.

Let us now consider the men of our own time, with regard to the custom of wearing waist-bands. We need but call to mind the fact that a belt of leather or other material, or a sash, worn tight, is associated usually with active muscular exertion. For example, the broad tight belt habitually worn in the gymnasium, abroad as well as at home, may be cited. Breadth of the belt appears to be an important consideration ; the broader the belt, the greater the constriction that can be obtained without producing discomfort. In this connection we may quote the fact that soldiers engaged in regimental sports are not unfrequently accustomed to substitute for the regulation belt a broader inelastic band, which they either manufacture for themselves or buy. The soldiers of most European armies wear a fairly tight belt ; and it is by no means uncommon for them, in addition, to wear a belt round the top of the trousers, although braces are, by the regulations, required to be worn. This under belt is tightened during forced marches. Similarly, our sailors, as those acquainted with naval matters are aware, are accustomed to tighten their belts before going into action. Rowing men, by the way, form an exception to the general rule, in loosening rather than tightening their belts. The cause of this is, that the abdominal muscles come specially into play in rowing, and that the pressure of a belt leads to cramp in these, presumably through interference with their blood supply at a time when a free circulation through them is specially requisite.

Many long-distance runners also wear an especially tight belt ;

this is markedly the case with the "Syces" who, in the East, run beside the horses, whose powers of endurance are so striking, and who are specially characterised by the tightness of their girdles. Finally, we may note the almost universal use of leathern belts by navvies and those employed in hard manual labour, very often in addition to braces, which will serve to recall a connection of which we might give many more examples.

In passing, we may refer to the employment of very tight girding as a means of stilling the pangs of hunger. The "Schmacht-riemen" of the North Germans, or the "hunger-belt" of the Zulus and Basutos, illustrate a fact of which some of us, at least, have had personal experience. In all probability the hunger-belt, by compressing the organs of digestion, interferes with their blood-supply, dulling thereby the sensations which constitute the feeling of hunger.

In conclusion we may mention that in South, and certain parts of North America, where the lasso is fastened, in one case to the girth, and in the other to the pommel, of the saddle, which necessitates the girths being drawn excessively tight in order to prevent displacement of the saddle, no harm to the activity of the horses appears to result. The girths are drawn to what, at first sight, appears a cruel extreme, very much more than would be possible with girths made after the English fashion, yet nowhere have we seen horses so quick and agile in their movements, or with such powers of endurance for long journeys. It is noteworthy that these horses, being grass-fed, are large-bellied, and that this necessitates the girth being fastened, not as in England, round the posterior part of the thorax, but round what corresponds to the waist in man. The fact that on the pampas of South America, where everyone, from the highest to lowest, habitually rides on horseback, very tight girthing is customary with people who never use the lasso, as well as by those who do, makes it evident that such tight girthing round this part of the horse is, at all events, not recognized as harmful to the powers of the animal. This, with the conclusions which we have attempted to describe in the above pages, leads us to suggest to trainers of horses, that it would certainly interfere less with the horse's breathing if the racing saddle were girthed, not over, but behind the ribs, and that they might thereby gain for the horse the same advantage as is experienced by the Syce from his broad, tight girdle. We think it desirable that someone should make a few experiments of a kind fitted to settle the question, whether the South American or the European mode of girthing be the better.
